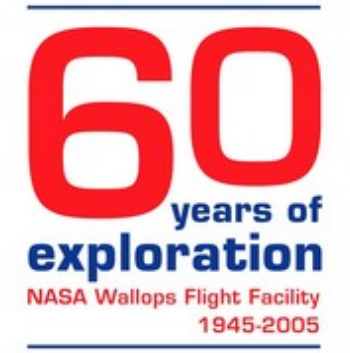
Wallops Flight Facility
1945 – 2005
60 Years Of Exploration
www.wff.nasa.gov



In 1945, Wallops Flight Facility (WFF) began as the Pilotless Aircraft Research Station under NASA's predecessor agency—the National Advisory Committee for Aeronautics. In 2005, Wallops celebrated its sixtieth anniversary. The past sixty years have seen NASA and WFF grow and evolve in the support of exploration, science, aeronautics, and education. This history has included the management and development of thousands of rocket, balloon, and aircraft systems, and the achievement of more than 16,000 launch operations, with an uncompromising focus on safety and a highly successful safety record.

Balloon Missions

During 2005, Wallops set a new long duration balloon flight record, when a balloon carrying the cosmic ray energetics and mass experiment flew for 42 days, circling Antarctica three times.

A new northern hemisphere, long-duration flight capability was also demonstrated with a balloon launched from Kiruna, Sweden, carrying the balloon-borne, large-aperture, sub-millimeter telescope payload in June 2005. The westerly flight lasted for 4.2 days and was terminated over Northern Canada.

New balloon systems and technological enhancements are also being pursued, including the development of the ultra long duration balloon system capable of extended duration, constant altitude flights at any latitude without the need for ballast. Numerous scaled model balloons have been fabricated and tested in the development program. A trajectory modification system that could make safe navigation around highly populated areas of the world is currently in the design stage.

The Balloon Office conducted 15 additional missions during 2005. The Wallops Safety Office was integral to each of these cutting-edge missions and technology efforts through its analyses and risk assessments.

Sounding Rocket Missions

The Sounding Rocket Program had a successful year, conducting 19 missions from WFF, White Sands Missile Range, Poker Flat Research Range in Alaska, and Hawaii. These missions involved NASA Space Science, educational outreach, and Department of Defense customers. The Wallops Safety Office supported these missions through mission analysis and operational support.

Two vehicle anomalies were experienced this past year, and the Safety Office took part in the investigation and return-to-flight activities.

The Safety Office also supported the flight test of a new sounding rocket vehicle in June of this year as Alliant Techsystems (ATK) advanced solid axial stage completed its first flight demonstration from WFF. This newly developed rocket motor was flown in a two-stage configuration using a Terrier MK 70 booster as part of a Sounding Rocket Program technology initiative. While the motor was manufactured in the late 1990s as part of a since cancelled Air Force sponsored program, the vehicle combination proved to be successful.

Aerosonde Uninhabited Aerial Vehicle Missions

WFF also continued its use of the aerosonde small, uninhabited aerial vehicles (UAVs) for science research, as well as for demonstration to non-NASA customers. Among this year's highlights was a successful flight into Hurricane Ophelia in which the UAV took measurements at 500 feet altitude in Category 1 hurricane winds, the first such measurements ever taken and the first such use of a UAV. Aerosonde also continued to show its utility for homeland security applications during flights conducted from the WFF Research Airport and UAV runway.

NASA RANGE SAFETY PROGRAM
2005 ANNUAL REPORT

Assumption of Responsibility for NASA's DC-8 Aircraft

The Wallops Aircraft Office assumed responsibility for NASA's DC-8 aircraft and transferred its operational activities to the University of North Dakota under a cooperative agreement in which the university will conduct earth science

research flights for NASA. WFF safety, project management, and engineering personnel assessed North Dakota's safety program, facilities, and processes, as part of certifying the university to maintain and operate the DC-8.

Educational Outreach

The WFF Educational Flight Projects Office conducted over 100 projects involving 377 schools that brought 655 students to WFF. It also involved participation by nearly 200,000 students at their home institutions through NASA personnel visits and through the recently developed "Control Center in the Classroom" capabilities that allow virtual participation in flight hardware integration and launch operations via webcasting. The Wallops Safety Office developed and reviewed safety procedures that protected the students from the inherent risk of flight operations for rocket, balloon, and UAV projects

For the second year, WFF supported the National Federation of the Blind Jernigan Institute's "Rocket On!" Program. Twelve blind high school students had their hard work pay off with the successful launch of a rocket from WFF on July 21. The students were able to determine the readiness of their experiments and the rocket through audible signals. The 10.5 foot rocket flew to an altitude of 5,829 feet. Data was received on all four student-built sensors, which measured light, acceleration, temperature, and pressure.

Also in 2005, WFF's first International Space Station payload, the Space Experiment Module Satchel carried student experiments aloft on a Russian Soyuz flight and returned them on the Space Shuttle flight, STS-114.

Research and Technology Development

The WFF Research Range—consisting of the WFF Launch Range, Research Airport, and Mobile Range—conducted over 800 operations for NASA, other federal agencies, academia, and commercial industry in 2005. These operations included activities such as suborbital research rockets, hypersonics flight testing, Department of Defense targets, and Department of Defense missile and aircraft tracking exercises.

Mission and safety planning efforts continue for several upcoming major orbital spacecraft missions: the near-field, infrared experiment on a Minotaur 1 rocket in 2006 and the Defense Advanced Research Projects Agency (DARPA) Falcon flight demonstration missions of new small, low-cost, expendable launch vehicles.

NASA Range Safety Program
2005 Annual Report

The Research Airport supported Langley Research Center's aviation safety, noise, runway friction, and other similar research programs. It also supported various UAV platforms and commercial water ingestion testing. The Research Range continued its pursuit of next generation technologies that will streamline the cost and schedule of operations. Range Safety engineering expertise continues to heavily support these efforts to ensure that they effectively address critical safety concerns. Specific technology developments include:

The Global Positioning System Operational Information Laboratory. This laboratory is funded by the NASA Office of Safety and Mission Assurance and implemented by WFF. WFF will build a performance database of Global Positioning System receivers on launch vehicles and the tools to analyze the database in order to quantify performance, identify operational limits, and recommend areas of improvement.

Autonomous Flight Safety System. The autonomous flight safety system will provide a completely on-board safety system, using on-board navigation and a flight computer containing safety algorithms to assess the need for flight termination of errant or otherwise malfunctioning launch vehicles. When needed, the system will initiate actions to destroy the launch vehicle in order to protect the public. While focused on rocket systems, the system could also be applied to balloons, UAVs, or other flight systems, and could ultimately eliminate the need for costly ground-based instrumentation and personnel involved in real-time flight operations. Flight of a prototype system will occur during 2006.

Low-Cost Telemetry and Data Relay Satellite System Transceiver (LCT2). The LCT2 is planned as a replacement for existing telemetry and data relay satellite systems for a fraction of the cost. NASA heavily relies on telemetry and data relay satellite systems in its most expensive and reusable flight systems. However, for its lower cost programs, particularly those in which the flight hardware is expended, the agency is looking at the LCT2. LCT2 will provide telemetry and data relay satellite systems capabilities at approximately $75,000 per unit, less than 20 percent of the cost of the current units.

Advanced Range Integrated Simulation Environment (ARISE). ARISE is a mission planning lab whose development serves as both a mission planning lab for designing trajectories and range support elements, as well as a technology simulator that encompasses the full spectrum of launch vehicle, range, and space-based resources involved in a launch operation. As a high-fidelity, hardware-in-the-loop simulator, ARISE will enable prototype hardware and software components of the vehicle or range to be laboratory tested for risk reduction before actual use in a space flight environment.